

Claims

What is claimed is:

- 205613
1. A computer-implemented method of monitoring network performance where performance requirements are already established comprising the steps of:
 - monitoring a performance-defining metric on a recurring basis to obtain samples of the metric value;
 - determining a trend in actual service based on obtained samples of the metric;
 - determining a performance violation time equal to the time at which the actual service will cease to meet the established performance requirements if the determined trend continues.
 2. A computer-implemented method as set forth in claim 1 wherein the step of determining a trend is performed using linear regression.
 3. A computer implemented method as set forth in claim 2 wherein the step of determining a trend includes the further steps of:
 - analyzing a set of samples obtained over a predetermined sampling interval to determine whether the analyzed set satisfies predetermined sample criteria; and
 - terminating the step where the analyzed set fails to satisfy the predetermined sample criteria.
 4. A computer implemented method as set forth in claim 3 wherein the step of analyzing a set of samples comprises the step of determining whether the standard deviation of the set is greater than a predetermined percentage of the mean of the sample.

1 5. A computer implemented method as set forth in claims 1 - 4 including the additional
2 step of generating an alert if the performance violation time is predicted to fall within a
3 fixed time window beginning at the current time.

1 6. A computer implemented method as set forth in claim 5 including the additional step
2 of canceling a previously generated alert in the absence of a prediction that the
3 performance violation time will fall within the fixed time window.

1 7. For use in a system wherein at least one network performance metric is required to
2 comply with predetermined requirements, a computer-implemented method for providing
3 an alert, said method comprising the steps of:

4 monitoring the provided service to obtain, on a recurring basis, sets of
samples representing actual network performance;

5 using the obtained sets of samples to generate a mathematical
6 representation of a current trend in the network performance metric;

7 using the mathematical representation, predicting the time when the
8 network performance metric will exceed a defined threshold if the current trend
9 continues; and

10 generating an alert if the predicted time is within a fixed time window
11 which begins upon execution of the method.

1 8. A computer-implemented method as set forth in claim 7 including the additional step
2 of transmitting the generated alert to a network operator.

1 9. A computer-implemented method as set forth in claim 8 wherein the mathematical
2 representation is generated using linear regression techniques.

1 10. A computer-implemented method as set forth in claims 7 - 9 wherein the step of
2 using the obtained samples includes the additional steps of:

3 calculating predefined statistical parameters of each obtained set of
4 samples;
5 determining whether the calculated statistical parameters meet predefined
6 threshold requirements; and
7 terminating the process if where the calculated statistical parameters for an
8 obtained set of samples fails to meet the predefined threshold requirements.

1 11. A computer-implemented method as set forth in claim 10 wherein the calculated
2 statistical parameters comprise the standard deviation and mean of the set of samples and
3 the predefined threshold requirement requires that the standard deviation be no greater
4 than a predetermined percentage of the mean.

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1 14. A system as set forth in claim 13 wherein the sample processor further contains logic
2 for performing linear regression operations using the obtained sets of samples of the
3 predefined service metric.

1 15. A system as set forth in claim 14 wherein the sample processor further includes:

2 statistical logic for determining the standard deviation and the mean of
3 each obtained set of samples;

4 arithmetic logic for determining the ratio of the standard deviation and the
5 mean of each obtained set of samples; and

6 thresholding logic for terminating any prediction where an obtained set of
7 samples is determined to have a ratio exceeding a predefined threshold.

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14. An article of manufacture comprising a computer useable medium having a computer
readable program embodied in said medium, wherein the computer readable program
when executed in the computer causes the computer to:

receive, on a recurring basis, sets of samples of a service metric obtained
by monitoring an actual network performance where the network is subject to at
least one predetermined network performance requirement;

determine a trend in actual service based on received sets of samples; and
predict when the service metric will exceed a defined threshold if the
determined trend continues.

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15. An article of manufacture comprising a computer useable medium having a
computer readable program embodied in said medium, wherein the computer readable
program when executed in the computer causes the computer to:

receive, on a recurring basis, sets of samples of a service metric obtained
by monitoring the actual performance of a network;

ignore any received set of samples which fails to satisfy predetermined
sample criteria;

8 determine a trend in actual service metric values based on retained
9 samples; and
10 predict when the service metric will exceed a defined threshold if the
11 determined trend continues.

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1 ~~16~~ An article of manufacture comprising a computer useable medium having a computer
2 readable program embodied in said medium, wherein the computer readable program
3 when executed in the computer causes the computer to:

4 receive, on a recurring basis, sets of samples of a service metric obtained
5 by monitoring the performance of a network;

6 use obtained sets of samples in generating a mathematical representation
7 of a current trend in service metric values;

8 use the mathematical representation to predict when the service metric
9 will exceed a defined threshold if the current trend continues; and

10 generate an alert if the elapsed time is less than a predefined time.

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1 ~~17~~ An article of manufacture comprising a computer useable medium having a computer
2 readable program embodied in said medium, wherein the computer readable program
3 when executed in the computer causes the computer to:

4 receive, on a recurring basis, sets of samples of a service metric obtained
5 by monitoring the performance of a network;

6 calculate predefined statistical parameters of sets of obtained samples;

7 determine whether the calculated statistical parameters meet predefined
8 threshold requirements;

9 ignore any set of samples for which the predefined threshold requirement
10 is not met;

11 use retained sets of samples in generating a mathematical representation of
12 a current trend in service metric values;

13 use the mathematical representation to predict when the service metric
14 will exceed a defined threshold if the current trend continues; and
15 generate an alert if the elapsed time is less than a predefined time.

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